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A Device for the Cinematic Study Of Anatomy and Movements Of the Larynx*

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THE usefulness of laryngeal photographs is readily apparent to anyone concerned with the study of the larynx. Whether the worker is interested in medical diagnosis or in evaluating functions and movements of the larynx, it is better to study photographs in motion and frame by frame than to have to rely entirely upon mirror examination of the subject.

This paper is written to describe an inexpensive and easily built device for motion picture indirect laryngoscopy, techniques of its use, and its application to date. The device was designed to aid Bosma[1-3] and his co-workers in the analysis of laryngeal motions in speech and non-speech functions. While utilizing cinefluorographic techniques as a basic procedure, these workers found a need for a device that would enable them to illuminate and photograph the arytenoid structures and as much of the true and false vocal folds as possible. Such a device would permit the viewing of the camera field with the camera running. In order to obtain pictures of nearly normal speech activities, it was also necessary that the subjects be examined while unanesthetized and as free as possible from foreign objects in the pharynx. It was especially desired that the subjects be in a natural position without postural tension on the suspensory muscles of the larynx. For these reasons, indirect rather than direct laryngoscopy was used.

As reported by Pressman and Hinman[4], laryngeal photographs were first attempted by Czermak in 1860. In 1862 Thomas French produced the first fully successful still pictures of the larynx. In 1913, while motion pictures were still in their infancy, Chevroton and Vlies produced motion pictures of the larynx. Other significant contributions to this field were made by Russell and Tuttle who, in 1931, made the first color motion pictures of the larynx. The Bell Telephone Laboratories produced black and white films of indirect laryngoscopy which were taken at camera speeds up to 4,000 frames per second. The Brubaker-Holinger cameras, now commercially available, were skillfully designed and engineered for endoscopic photography, including that of direct laryngoscopy which involves the placement of an endoscope in the laryngopharynx. Thus, major advances in the science of

*This study was aided by a grant from the National Foundation for Infantile Paralysis.
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photography have been promptly utilized to improve techniques for the photography of the larynx.

Materials and Methods

Kubicek and Kottke, of Minnesota, built the prototype for this device and used it for the study of postpoliomyelitis subjects. Their model, as diagrammed by Bosma[1], used the illumination of a 1,000 watt, 3¼ x 4 inch lantern slide projector located at nearly a right angle to the axis of the camera. The beam of illumination was projected by means of a prism in a direction that converged on the line of sight of the camera lens. The larynx was presented to the camera by means of a laryngeal mirror which was guided into the posterior portion of the oral pharynx. This mirror was tilted horizontally in order to give a downward view into the area being studied.

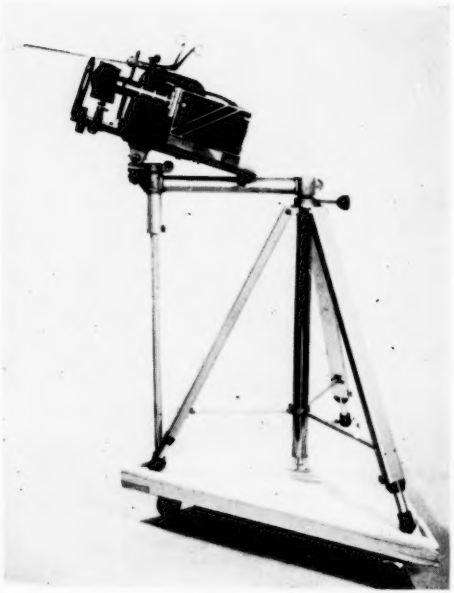

Figure 1. Apparatus for motion picture indirect laryngoscopy.

The present writers modified the design of the apparatus of Kubicek and Kottke. Changes were made to reduce its size, increase its maneuverability, and provide a convenient viewing system. An experimental working model was built and is still being used.

As seen in Figure 1, the camera employed was an unmodified spring-wound Cine-Special Kodak I. An f 2.7, 102 mm. Kodak Ektar lens with a 13 mm. extension was used. The light source illustrated in Figure 2 consisted of a 2 x 2 inch projector without the projection lens. Because of the short duration of the takes, a 500 watt lamp was used without the usual cooling fan. This prevented vibration and noise and eliminated bulk. A physician's concave head mirror of 8 inch focal length was mounted in front of the camera lens. This was located at an angle of about 45 degrees to the axis of the camera lens, and its circular hole was enlarged into an ellipse to prevent cut-off of the field of vision of the lens. In order to reduce the size of the apparatus, the illuminator was placed nearly parallel to the camera. This procedure necessitated the use of a second mirror to place the illuminating beam on the concave mirror. The beam of light was then reflected from the concave mirror onto the laryngeal mirror and down into the larynx. The path of the light beam can be traced on Figure 2. The vertical tilt of this mirror was controlled by the scissor-type handle of a biopsy instrument which was adapted for the mounting of the mirror. The mirror could also be rotated by means of a worm gear.

Because of the distance from the laryngeal mirror to the ground glass focusing screen of the camera, and because a poor image was produced on that screen, a

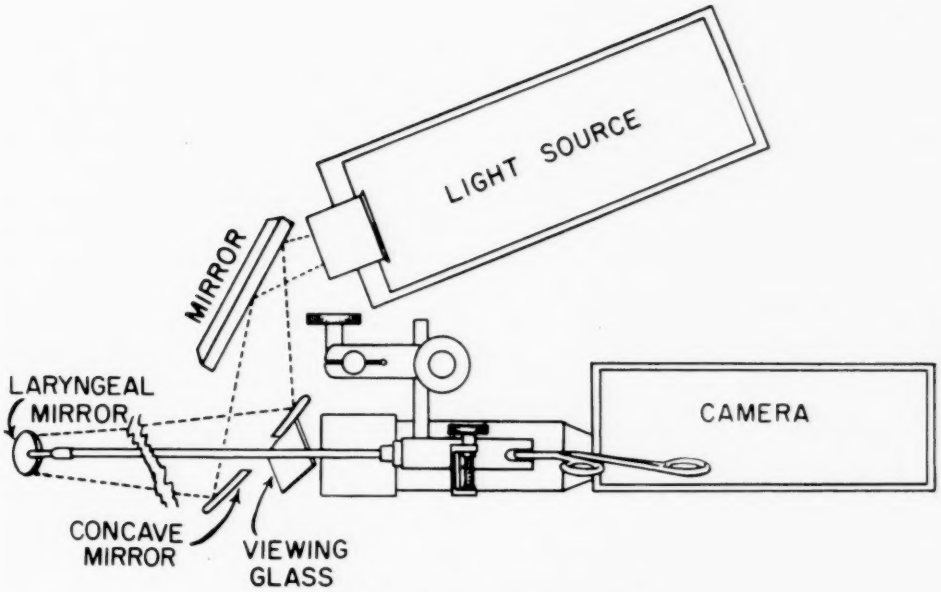

Figure 2. Diagram of apparatus.

piece of clear, uncoated glass was mounted at an angle between the camera lens and the opening of the concave mirror. This glass served as a viewing screen on which the operator could see a clear image of the camera target.

This entire unit was supported by a large tripod on a wooden triangular base with casters. A tripod extension arm was used to keep the base at a convenient distance from the patient and chair, and this arm was rigidly supported by a piece of electrical conduit. The camera could be removed at any time for other uses. An Auricon 100 foot sound camera could be substituted without modification of the camera base or of the illuminating apparatus.

Photographic Techniques

In using this equipment a focusing target was aligned and prefocused for the distance from the camera to the vocal folds. This distance for each subject was determined by holding a straight-edge ruler beside the throat and measuring the distance from the bottom of the ear lobe to the thyroid notch. To complete this focus, the target was viewed in the ground glass focusing screen of the camera.

Exposure was determined by a meter reading taken from a standard gray card located at the same distance as the intended plane of focus. Anscochrome tungsten type film was used at the recommended emulsion speed and was given standard development. Generally, a camera speed of 24 frames per second was employed.

Clinical Examination Technique

The clinical technique for the use of this equipment evolved from conversations with Bosma and with Anderson[5], from study of the procedure for indirect laryngoscopy recommended by Jackson and Jackson[6], and from the writers'

experience. Two principal problems had to be resolved in order to view the larynx successfully: (1) Reduction of the gag reflex, and (2) achievement of proper subject positioning.

An attempt was made to reduce the subjects' gag reflexes by the application of a local anesthetic. This was sprayed onto the posterior pharyngeal wall, palate, and back of tongue. While this procedure did tend to reduce the gag reflex, it was discontinued because it was time-consuming and unpleasant for the subjects. Rather than using the local anesthetic, reduction of this reflex was then approached by suggesting to the subjects that they would not gag and by having them condition out the gag reflex by repeatedly touching the posterior wall of the pharynx before their first appointment for indirect laryngoscopy. An effort also was made to avoid touching the posterior surface of the tongue, the muscular palate, or the posterior wall of the pharynx with the mirror. Fortunately, the palate was a less sensitive structure for the elicitation of the gag reflex than were the other structures, for it was often necessary to move the muscular palate aside with the laryngeal mirror.

Mirror size was also important to the avoidance of gagging. A No. 5 laryngeal mirror was used consistently in this work to obtain a picture of adequate size. However, this was too large for children and for some adults. Jackson and Jackson recommended use of a mirror that would pass into the pharynx without touching the tonsils.

In order to obtain a position so that the pharynx structures would be in the proper relationships to allow viewing of the larynx, the subject was seated well back in the chair. Correct height was determined by adjusting the seat until the tragus of the ear was lined up beside the mirror rod as the subject leaned forward. According to Jackson and Jackson, the head should be 30 centimeters forward from the line of the back of the chair.

With the mouth of the subject opened widely, the oral cavity was guided over the mirror. It was necessary to place the posterior wall of the pharynx as closely as possible to the mirror without actually touching it. The proper relationship of mirror to pharynx is shown in Figure 3. The angle of the mirror was adjustable, as described previously, but an angle of about 40 degrees from the horizontal was generally found to be most appropriate. While adjusting the subject to the mirror, the operator looked directly into the subject's mouth until the mirror was approximately in the correct position. He then checked the glass viewer for the image.

It should be mentioned that the sub-

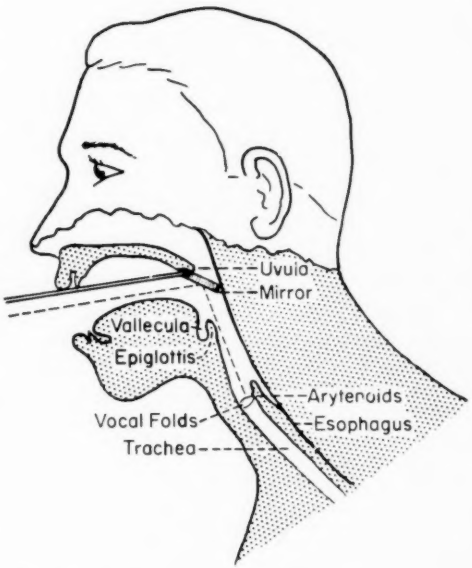

Figure 3. Diagram of position of mirror in subject.

jects were assured that they were to feel free to withdraw from the mirror at any time. It was noted that some subjects were bothered by a rapid accumulation of secretions and needed to withdraw from the device frequently in order to swallow. To encourage the subjects, the operator would name landmarks, such as the epiglottis, as they came into view, and no negative comments were made. For more anxious subjects the camera was run before the vocal folds or arytenoids were seen. This seemed to reduce their tension by eliminating their fear of failure.

A secondary problem of positioning was that the surface of the tongue obscured the view of the larynx. Jackson and Jackson described a technique for avoiding this by having the examiner hold the tongue in protruded position with a sterile gauze. This technique was used successfully with some subjects in the present study. Other subjects were able to hold their own tongues in the described manner. For some, neither method was satisfactory as the dorsum of the tongue humped regardless of the strength of pull exerted on the tongue. With such subjects it sometimes helped to have an assistant hold the tongue down with a tongue depressor. At times, a mirror was used to teach the subjects how to position their tongues, and combinations of the above techniques were used.

Two additional problems which arose were fogging of the mirror and sound recording of the subjects' vocalizations.

As the mirror was introduced into the mouth, change in air temperature and humidity caused a fogging of the reflecting surface of the mirror. This, of course, made it impossible to obtain good photographs. This problem was avoided by sterilizing the mirror with alcohol and then applying Lens Bright ®, a product designed to prevent the fogging of eye glasses. A technique more commonly used to avoid the fogging of laryngeal mirrors is to warm them immediately before use. Hot water may be used for this purpose.

Vocalizations of each subject, as he was being photographed, were tape recorded so that the study of sound and picture could be correlated. However, as a suitable degree of playback synchronization could not be obtained, this technique was unsatisfactory.

Results

As was mentioned in the introduction, the goal of this paper was to report on the development and use of a photographic device designed to complement cine-radiography for the study of the larynx in speech and non-speech functions. While an attempt was made to photograph as much as possible of the vocal folds, the criterion for successful indirect laryngoscopy was to obtain motion pictures of the activities of the arytenoid structures.

A list of activities to be photographed was made and used. However, the three most commonly used activities were: phonation with normal voice of *ae* as in "man", *ah* as in "father", and *u* as in "sun": phonation of the same sounds with falsetto voice; and fixation. The *ae* sound seemed to open the pharynx and reveal the larynx better than did the other sounds, and production of this sound with the falsetto voice was even more effective than its use with normal voice. Whispering and shouting of this sound were also useful.

Figure 4 shows examples of the pictures of the arytenoids and vocal folds that were obtained with this device. Only rarely was the apex of the vocal folds

seen as in Figure 4a, and then the arytenoids were often obscured. More frequently the arytenoid masses were photographed as in Figure 4b, which shows the apposition of the arytenoids in the midline.

Difficulties were met during the initial attempts at the use of this technique. With the first subjects the writers were able to obtain only brief and infrequent glimpses of the vallecula and epiglottis. However, with repeated practice greater adeptness was achieved, the operators and the subjects relaxed, and subsequently good pictures were obtained.

Since the time of these initial studies, twelve subjects have been photographed. This group consisted of adolescents and adults of both sexes and one male child. Adequate photographs were obtained of seven of these persons. Inability to obtain satisfactory pictures of the other subjects result from several reasons: focusing error and uncontrolled gagging in one subject, gagging in the child, and blocking of view by secretions in a postpoliomyelitis subject. In two other postpolio subjects it was impossible to align the mirror so that it reflected the arytenoid cartilages or vocal folds. It is possible that in these two subjects contractures of the suspensory muscles of the larynx had pulled the larynx out of its usual position, thus making indirect laryngoscopy more difficult.

Adequate pictures were obtained at the first sitting with five subjects and at the second sitting with the other two. All subjects were more relaxed and comfortable after their initial experience with this procedure. The amount of time required to obtain a picture of the larynx varied from a few minutes to over a half hour. Attempts to work for longer periods of time caused discomfort in some subjects.

Since the film illustrated in this paper was taken, several modifications of the device have been tested or contemplated. Light intensitiy was increased by revising the lamp housing to obtain a light beam of greater diameter. This beam was then concentrated by changing the physician's head mirror that was described earlier to one of five inch focal length. Further improvement in the utilization of the existing light was made by moving the light source to a position at a right angle to the camera. This made possible the elimination of one reflecting mirror. These improvements resulted in a greater depth of field. Furthermore, an increase in image size was obtained by the addition of a supplementary camera lens.

Other changes that have been considered include: installation of an illuminator foot control switch for use by the operator, use of a single system sound camera, and the development of a mask to eliminate unwanted periphery of the image. Also, it was found to be helpful to provide the subject with a mirror so that he could observe and control his tongue as indirect laryngoscopy was being performed.

Summary

A simple device for the photography of indirect laryngoscopy is described. Included in the paper are a discussion of techniques for use of this instrument and a statement about the results of its use. It is felt this device can be used to obtain motion pictures of movement of the arytenoid structures and the vocal folds.

Success in the use of this device depended upon several factors, including proper use of photographic and clinical examination techniques and teamwork

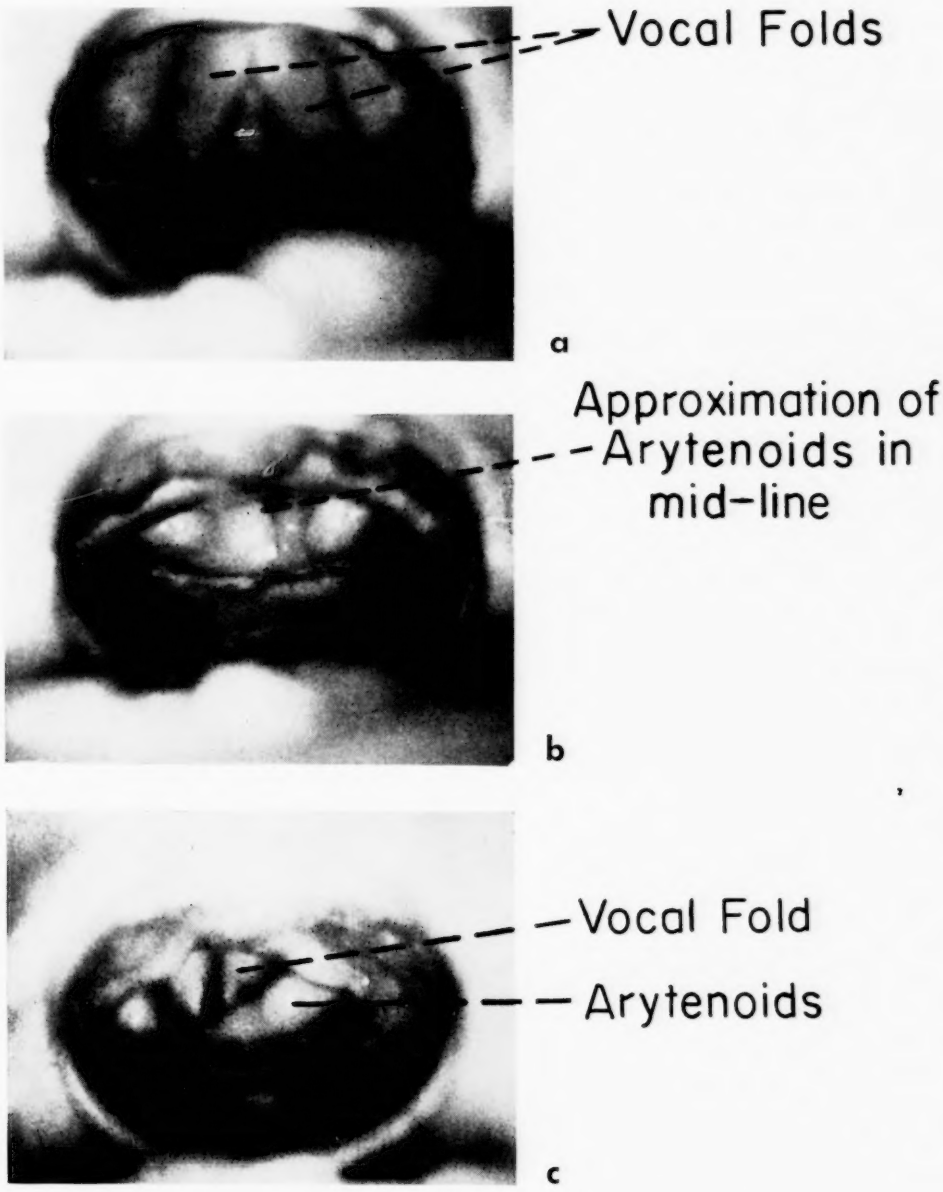

Figure 4. Example Frames from Cinema Laryngoscopy of Normal Subject.
a. Vocal folds.
b. Line of apposition of arytenoids.
c. Separation of vocal folds during activity.

of the operator and the photographer. The early establishment of good rapport with subjects was essential; until they were comfortable and cooperative, proper positioning was difficult and adequate pictures could not be obtained.

Acknowledgements

The authors are particularly indebted to Dr. William Kubicek and Dr. Frederick Kottke who loaned them the prototype device described in this article. Others who contributed to the research and development described, or to the writing of the paper, include: Dr. James F. Bosma, Dr. Bernard A. Anderson, Mr. Julian Maack, Mr. Sam G. Fletcher, Dr. Richard C. Haskins, and Mr. Gene Long.

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Marking a Field on a Microscope Slide By the Use of Diazotype Film

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THE marking procedure is simple and rapid when the materials are prepared for use in advance. The size and extent of a field selected for photomicrography may be precisely indicated.

The exactness of the method is its outstanding advantage over the other direct marking and recording procedures listed below:

1. Recording mechanical stage settings.
2. Recording the microscopic index numbers seen on a substituted locator slide.
3. Marking the slide area with a diamond pointed circle marker.
4. Marking with the inked front end of a sleeve fitted over the 16mm objective.[1]
5. Marking the desired area on a low magnification paper negative photomicrograph.[2]
6. Making an ink spot adjacent to the area of interest.
7. Making a wax pencil smear on the cover glass and marking the area of interest by scratching the wax with a needle point.

In the procedure to be described, a small piece of photosensitive diazotype film is taped in contact with the top surface of a microscope slide or cover glass. The film directly above the selected microscopic field is exposed to an intense spot of light concentrated on it by the substage condenser. The film is dry developed by holding the slide so that ammonia fumes will pass over the film. The exposed spot remains clear, the rest of the film darkens and becomes sufficiently developed in about a half minute. (Fig. 1) The clear spot may be as small as needed to indicate an object viewed under the highest power.

The diazotype film consists of an acetate base coated with a stable mixture of a light-sensitive diazo compound and a phenol which coexist without coupling in a slightly acid medium. If part of the film is exposed to intense ultra-violet or violet light the diazo compound is decomposed. When developed in the fumes of ammonia, the remaining unexposed diazo compound couples with the phenol compound to form a dye, and the fully exposed area remains clear.

Ozalid Viewfoil Black 101 X is one of the diazotype films with suitable characteristics, and may be obtained inexpensively in 5 x 7 inch or larger sheets, .005 inch in thickness.

The film has very low sensitivity to light and may be handled under average incandescent light, and subjected to microscope illumination ordinarily used for viewing without being noticeably affected.

Figure 1. High and low power fields indicated on diazotype film.

Practical application of the method requires that small pieces of film with tape adhering be prepared in advance for convenient handling and attachment to the microscope slides. The sensitized surface is abraded lightly or coated with microscopic particles of ink so that it can be focused upon under the microscope.

Figure 2. The sensitized film surface is scratched or is coated with ink particles to make it visible under a microscope.

Preparation of Film Tabs

Cover the entire sensitized surface of a narrow strip of diazotype film with fine scratches, by rubbing with a soft material such as a pencil eraser. Attach two strips of drafting or masking tape, adhesive side to the film *base*, as shown at the top of Fig. 2.

For use on slides prepared without cover glasses, attach the tape to the sensitized surface of the film. Instead of scratching the sensitized surface, paint it with a dilute wash of India ink, water, and Braun non-crawl color medium. Mark the tape with a line to indicate sensitized side up (Fig. 2, bottom).

Cut small tabs of assembled film and tape. Place across ridges or wire mesh in a box for easy removal, (Fig. 3) and close cover.

Figure 3. Tabs of film with drafting tape attached are prepared for convenient use.

Illumination

A microscope lamp equipped with a field diaphragm, and providing intense, even illumination gives best results. The intensity is reduced for visual use by a filter placed in front of the lamp diaphragm. The filter may be in a separate holder for easy removal from the path of light. It should be perpendicular to the beam to avoid deflection. A light source great enough to require a neutral density 2.0 filter (factor 100x) for comfortable visual microscopy is desireable. The microscope and the lamp are accurately aligned and adjusted for Koehler illumination.

The substage condenser forms an image of the lamp diaphragm aperture in the plane of the microscopic specimen. The minimum size of field indicating spot that can be produced on the diazotype film is determined by the optical correction of the substage condenser lens system, and the smallest aperture to which the lamp iris can be closed.

Slide Marking Procedure

One purpose of this method is to make it possible for the microscopist to accurately mark high power as well as low power microscope slide areas. Brief notations specifying structures to be focused upon or emphasized in photomicrography may accompany a marked slide. If the fields are selected at the photomicrographic microscope by the microscopist, they can be marked rapidly by the photographer, who can develop the film on one slide while the next slide is being investigated. The microscope to be used for selection must be accurately aligned and adjusted for Koehler illumination. Slide marking procedures are given on the three illustrated charts which follow. It is recommended that a procedure chart or charts be kept for reference at the microscope to be used.

Procedure Chart A gives information for marking areas viewed under dry objectives up to the 4mm achromat.

Procedure Chart B gives additional instructions for indicating very small areas to be photographed or examined under a high dry or an oil immersion objective.

Procedure Chart C provides a method for indicating areas on a slide prepared without a cover glass, in which case the diazotype film is used sensitized side up. The sensitized surface is made visible even if immersed with oil by a coating of finely dispersed microscopic India Ink particles as described earlier under "Preparation of Film Tabs". The oil on the sensitized surface must be removed with xylene before development in ammonia fumes.

Relocation of Slide Areas

The developed film attached to the slide is examined with a hand magnifier to determine the location, size and number of indicating marks, which appear as clear discs on the darkened film.

The slide is placed on the microscope and observed from alongside. If the condenser and lamp diaphragms are opened fully and filters removed, a flash of light will be seen as the clear area is moved into the illuminating beam. The clear spot is viewed and centered under a low power microscope objective. A higher power objective may be used before the film is removed, if its working distance permits.

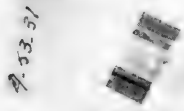
The lamp diaphragm is closed down so that its image coincides with the clear spot on the film.

The microscope is next focused on the specimen and the substage condenser is racked downward to bring the lamp diaphragm image into focus on the specimen.

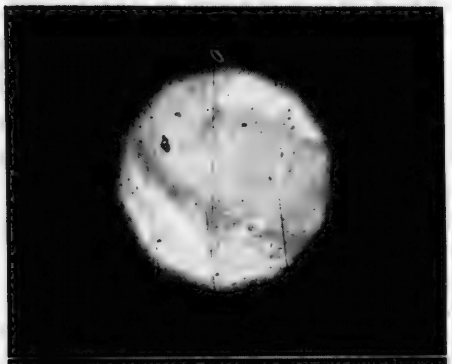
If only one area is marked the tape is removed and the slide cleaned in preparation for photomicrography.

Procedure Chart A. To mark low power fields.

1. Focus the image of the lamp (field) diaphragm on the specimen by movement of the substage condenser. Adjust the field diaphragm to illuminate only the selected area.

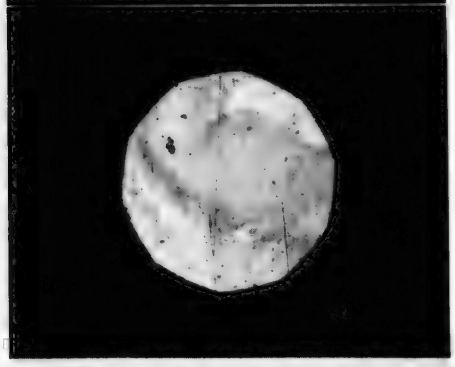


2. Attach the diazotype film, sensitized side down, over the selected slide area.

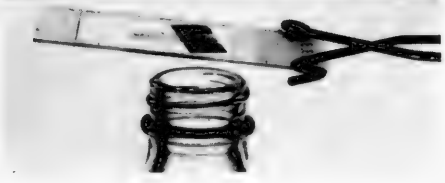


3. Focus the microscope on the scratched film surface.

4. Rack the substage condenser upward to focus the field diaphragm on the scratched film surface.

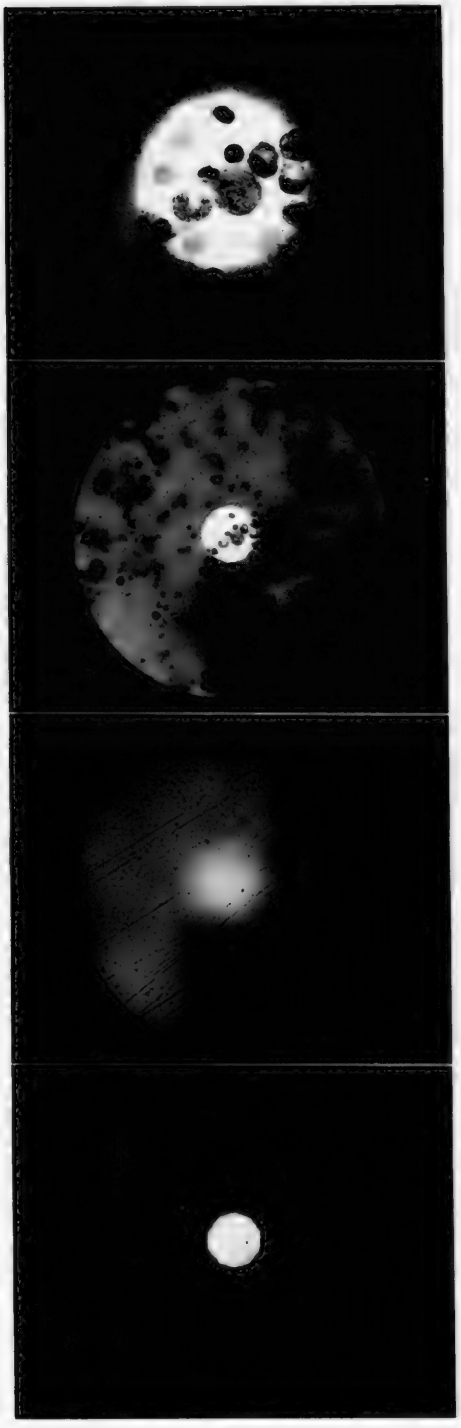


5. EXPOSE the selected spot on the film to intense light by removing all filters from the illuminating system for 15 seconds to 1 minute.



6. DEVELOP for 30 seconds in ammonia fumes.

Procedure Chart B. To mark high power fields.



1. Focus the lamp (or field) diaphragm image on the specimen by movement of the substage condenser; and adjust the lamp diaphragm opening to illuminate only the subject matter of interest.

2. Attach the film, sensitized surface down, to the dry slide.

3. Change to a low power objective, and check the centering of the subject.

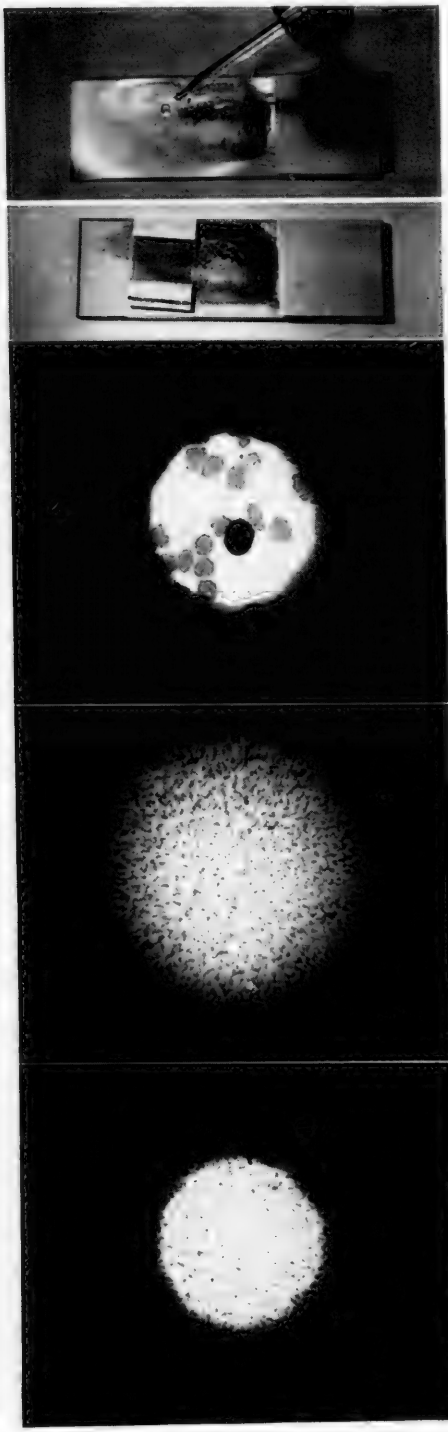
4. Focus on the scratched film surface.

5. Raise the substage condenser to focus the lamp diaghragm image on the film.

6. EXPOSE to full intensity, unfiltered microscope illumination for 15 to 30 seconds.

7. DEVELOP 30 seconds in ammonia fumes.

Procedure Chart C. To mark fields on a slide prepared without a cover glass.



1. Apply immersion oil sparingly to the area of interest.
2. Attach the film, sensitized surface up, so that the oil spreads in contact with the film base. The film serves as a cover glass. Dry or oil immersion objectives may be used.
3. Focus the image of the lamp (or field) diaphragm on the specimen by movement of the substage condenser; and adjust the lamp diaghragm opening to illuminate only the area of interest.
4. Focus the microscope upward onto the finely dispersed India ink particles covering the sensitized film surface.
5. Rack the substage condenser upwards to focus the lamp diaphragm image on the film.
6. EXPOSE to full intensity, unfiltered microscope illumination for 15 to 30 seconds.
7. DEVELOP 30 seconds in ammonia fumes.

If more than one area is marked on a film, mechanical stage readings and sketches will serve to relocate them after the film is removed. Alternatively, after examination and notation of all the indicated areas, one of the pieces of tape may be detached from the slide and the film raised and folded back. When folded down again, the indicating marks will fall close to their original positions.

A slide area may be re-marked by the diazotype method after a photomicrograph is made, for relocation on any microscope.

Summary

In our experience, the slide area locating procedure described has proved to be the method of choice when a supply of prepared diazotype film tabs is available at the microscope.

The value of having the exact boundary of a selected field indicated for photomicrography, and the simplicity of the marking procedure, outweigh the disadvantage of having to remove the film for critical examination or photomicrography.

The microscope slide area marking procedure using diazotype film was developed to save time in selecting fields, and to provide the photographer with information needed for the determination of optimum magnification and utilization of the most suitable optics for the specified subject.

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1. Vetter, John P. An Inexpensive Slide-Area Marker. J. Biol. Phot. Assoc. Vol. 18, No. 4, 1950, p. 180-181.
2. Meiller, Fred H. Paper Negatives as an Aid in Selecting Fields in Photomicrography. J. Biol. Phot. Assoc. May 1952.

Were *Your* Entries Accepted?

Some comments and suggestions from the judges of the print and transparency salon, Rochester, Minnesota, August, 1957.

These comments are passed on to members for the purpose of apprising them of the reasons for the rejection of many of the entries.

1. Poor selection of color and/or extraneous material in the background.

If a color background is indicated select a complimentary color, or one that does not vibrate or appear similar to the subject color.

2. Careless method of presentation: uncleanliness in masking; labels cut into the transparency. Specimen poorly posed.

Arrange material to form a simple pleasing composition. Eliminate everything from the picture that is not pertinent to the center of interest. Crop or mask with this in mind.

3. In many entries the scale was not parallel with the edge of the print or transparency; some were much too large in proportion to the subject matter; in some the scale was too prominent.

When photographing a scale with a

specimen, select one in which the width and length will merely serve to indicate the size of the object. It is not necessary to employ a scale which will extend across the entire specimen, nor should it extend across the entire length of the negative. It is advisable to have at hand scales or rulers of varying widths and lengths. Transparent rulers are valuable in some instances. White rulers or scales are not indicated in all cases. Use of stained white plastic rulers in various colors may also be used to eliminate the glare and reduce their prominence.

4. Poor illumination. There were many examples of lighting that was too flat. In some, the highlights were disturbing.

A little effort in striving for roundness of illumination and elimination of highlights will enhance the picture. This does not mean eliminating all highlights, for a few well placed or chosen highlights will improve the end result.

5. Some entries showed incorrect exposure. Varying the exposure time will afford better selection. If color processing is done by a commercial laboratory select the very best processor.

6. In a few cases the pathologic area was somewhat masked or placed away from the center of the specimen, making it difficult to recognize.

A small arrow pointing toward the lesion would be helpful.

7. Partially fixed or completely fixed specimens are unsatisfactory for color photography. The loss of the true color of the fresh specimen is very noticeable. In a few entries a good black and white photograph would have been more instructive than the one in color.

8. A few entries presented a series of photographs in which the story could have been told with fewer pictures.

It is desirable to tell a story in as few words (pictures) as possible. Avoid making a series of pictures when a combination photograph will suffice.

9. Some photographs of surgical procedures contained too many extraneous instruments and hands.

This type of illustration is much more effective if it is confined to the surgical field. Cleanliness of the background (towels, sheets) is of major importance.

These comments are presented in order to indicate to the exhibitor and prospective exhibitor what a judge looks for when selecting quality salon productions.

Leo C. Massopust, Sr., FBPA, School of Medicine, Marquette University
Harland P. Nasvik, APSA, Manager, Photographic Service, General Mills, Inc.
Malcolm B. Dockerty, M.D., Consultant Surgical Pathology, Mayo Clinic

Journal of the Biological Photographic Association Vol. 25, No. 4 November, 1957

Photography of Heart Valves with the Cardiac Pulse Duplicator*

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11428 Santa Monica Blvd.,
Los Angeles 25, California

Introduction

A FLACCID, dissected human heart can provide answers to many questions of anatomy and morphology. However, when information on the physiological functioning of this organ under normal or pathological conditions is desired, the usual study of the cadaver heart offers only limited help. The cardiac pulse duplicator makes the isolated human heart function in a most realistic manner, simulating closely the hydro-dynamic and muscular actions of the living heart. This device opens up many new opportunities for instruction, research, and the development of diagnostic and surgical techniques.

Description of the Cardiac Pulse Duplicator

The primary consideration was to duplicate the normal live human heart action as closely as possible with a fresh isolated heart. Others have used pulses of fluid through a heart to cause valve action [1,2,3,4]. Although this method has been of great value in pioneering photographic study of the valves and development of surgical procedures, the heart served only as a conduit for the perfusing fluid. Our problem was to make the heart itself contract and dilate in normal pumping action.

In the cardiac pulse duplicator (Fig. 1-a) the heart is suspended by the great vessels in a water chamber. A piston connected to this chamber transmits pressure pulses through the water to the heart causing it to contract and dilate with each piston cycle. The displacement of the piston is adjusted to conform to the size of the heart under study and the beat rate is controlled by adjusting the voltage on the drive motor. The ventricular contraction is normal even to the forward thrust of the tip of the heart. By this hydraulic means, the heart is made to "beat" in a manner analagous to the natural beat in the human breast.

In this model of the cardiac pulse duplicator one side of the heart is observed at a time (Fig. 1-b.) If the left heart is connected, the aortic and mitral valves are visible through the viewing ports. If the right heart is under study, the tricuspid and pulmonary valves are visible.

The heart is supended by clamping or tieing each of the two great vessels to aluminum cylinders affixed immediately under the glass ports in such a way that the valves are in full view. As the

* Presented at the 27th Annual Meeting of the Biological Photographic Association, Rochester, Minnesota, 27 August, 1957.

Figure 1 (a).

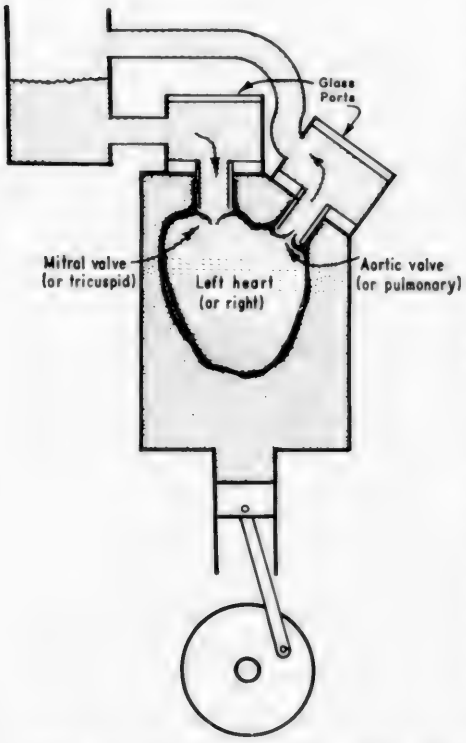

Figure 1(b) The Moody cardiac pulse duplicator. The heart is supported in a plastic chamber completely filled with water. Piston movement causes contraction and dilation of the heart which is thereby made to pump a fluid through an external circulatory system. The operation of the valves can be viewed through observation ports.

piston is actuated, the heart muscle is contracted and dilated causing the heart to pump a transparent fluid such as water. Because the pumping action results from the forced contraction and dilation of the heart muscle itself, the valvular action is very lifelike.

The conditions of the external circulatory path may be varied to simulate various pathological or physiological conditions. For example, the introduction of a constriction in this external circuit would represent an arteriosclerotic condition with the degree of circulatory friction under control. On the other hand, excessive opening of the external circuit simulates the condition of shock. Such circulatory conditions, external to the heart, affect valve operation very markedly. Pathological hearts can be studied with ease, as well as the effect of the inclusion of prosthetic devices such as artificial valves.

Photography with the Cardiac Pulse Duplicator

While this cardiac device is admirably suited to qualitative visual observations, it is recognized that for research purposes photographic recording facilities are needed. Because of the inadequacies of still photography in recording the movement of heart valves, efforts have been concentrated on motion pictures taken with synchronized repetitive stroboscopic illumination. Such short pulses of light yield sharp individual frames which can be utilized as stills if desired.

Top illumination of the heart valves presents some problems as both photography and illumination must be accomplished through a tube of approximately an inch in diameter. This can be done with ordinary equipment but most conveniently with a "cavity camera" in which the light is introduced along the optical axis of the lens.

Rear illumination gave the most revealing and dramatic effects. By stripping a General Electric FT-118 flash tube to its basic coiled quartz tube, it is small enough to insert into the ventricle itself through the valve which is not being photographed. The electrical conductors do not appreciably disturb the action of the valve through which they pass. The translucent nature of the valves and surrounding tissue reveals details under rear illumination otherwise

invisible. The quartz coil should be positioned so that the camera will not "see" it when the valve is open. For immersion, terminals of the flash tube were cast in plastic.

Photographic Procedures and Equipment

Motion pictures in 35mm and 16mm Kodachrome have been obtained. For 35mm an Acme process camera was utilized which was equipped with a contactor synchronized with the shutter. Daylight Kodachrome was used because of the desire for a selected color-still sequence. For protection, 35mm Eastmancolor contact negatives (Type 5248) were made from which several Eastmancolor positives were printed on Type 5382 film. In this way selected frames could be cut out and mounted in single-frame 2 x 2 mounts without destroying the original.

A Cine Kodak Special camera was used for obtaining 16mm motion pictures. A set of contact points actuated by the single-frame shaft triggered the flash tube while the shutter was open. A convenient solenoid release was used to start and stop the spring driven camera. With stroboscopic pulse illumination the frame repetition rate may be varied without affecting exposure.

A potential of approximately 1000 volts was applied to the flash tube electrodes. Actual firing was accomplished by a high voltage pulse initiated by the closing of the synchronizing contractor in a conventional way. For a given power supply capacity, there is a definite upper limit to the rate at which the flash tube can be fired. The value of the storage capacitor is selected so that the high-voltage power source can charge it to essentially full voltage in the time available between frames. For rates of from 12 to 24 frames per second, used in this case, a capacitance of 2 microfarads and lens apertures from f 2.8 to f 5.6 were used.

Photographic Results

While the most interesting and fascinating results are revealed by motion pictures, still sequences taken from them are valuable for careful study. Figure 2 shows a sequence of the aortic valve cycle as viewed through the port. Figure 3 shows a comparable series of the mitral valve. All of these are rear illuminated, i.e., with the strobe lamp placed within the heart.

The cardiac pulse duplicator ports can be used to obtain unusual views of heart valve operation as viewed from *inside* the heart. One port is clamped onto the great vessel leading to the valve under study for the purpose of providing a fluid conduit and the introduction of the flash tube outside this valve. Another port is inserted in a hole cut through the ventricle wall and clamped to the tissue to provide a water-tight joint. This is the port through which the camera is pointed. Compressing a rubber syringe in the circuit of the perfusing water causes the valve to function as it is being photographed. Basically, this is the system used by McMillan, Davila and Glover, Klassen and others and is subject to possible anomalous effects but the results are extremely interesting as shown by the sequence showing the inside of the mitral valve in Figure 4.

Conclusions

The isolated human heart can be made to "beat" in a very realistic way by means of the cardiac pulse duplicator. Viewing ports allow visual or photographic observations of the heart valves under a wide variety of possible condi-

Figure 2. The aortic valve of the human heart as viewed through the port of the cardiac pulse duplicator.

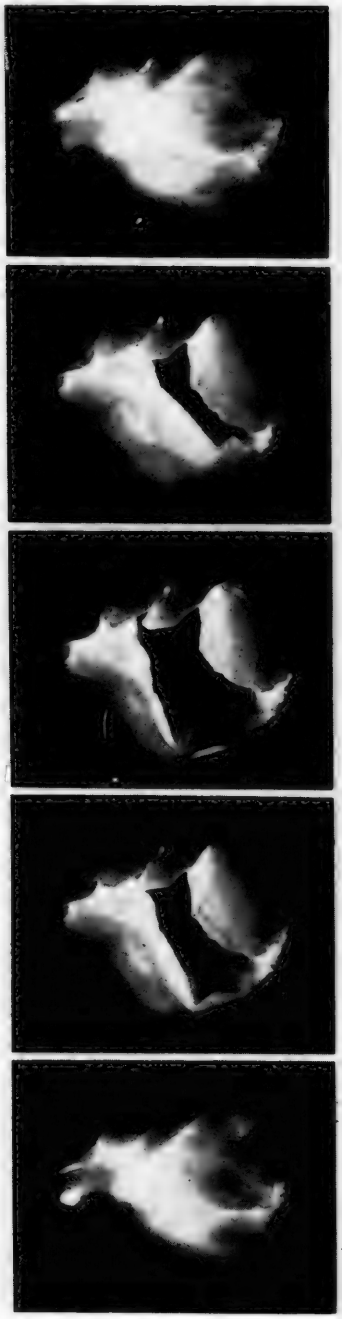

Figure 3. The mitral valve of the human heart as viewed through the port of the cardiac pulse duplicator.

Figure 4. Inside view of the mitral valve of the human heart obtained by a modification of the cardiac pulse duplicator.

Figure 5. The observation ports of the cardiac pulse duplicator may be used to obtain motion pictures of valve action as viewed from *inside* the heart with the arrangement shown. (Edwin C. Udey, left, and G. Keith Hargett, right, of Moody Institute of Science staff.)

tions of circulatory pressure, pumping rate, etc. It is felt that this device has much to offer for instruction, research, and the development of new corrective procedures.

Acknowledgements

We wish to acknowledge our deep gratitude to our many colleagues at Moody Institute of Science, especially Irwin A. Moon, Robert Miller, Theron Miller, Edwin C. Udey, Aram Peter Margosian, Leonard Hughes, and Willman Green, who have collaborated with us in the development and use of the cardiac pulse duplicator.

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A Method for Producing Impromptu Surgical Motion Picture Films

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Introduction

EVERY medical photographer soon learns that it is not always possible to prepare shooting scripts in advance of scheduled shooting times. All too often he is notified only hours, or even minutes, before making a surgical motion picture film. This means that the photographer has not had the opportunity to discuss with the surgeon the objectives of the film. Thus, in place of a photographer-surgeon team, there are two specialists working independently, with the hope of bringing together scenes that will adequately describe a specialized surgical technique. The end result is obvious—the film usually consists of a series of shots which could well have been taken with a still camera. Though this footage may indeed contain good technical material and be of superb quality, it usually ends up on a shelf instead of being shown. Although there is no substitute for careful and timely planning, there are steps that may be followed in order to produce a useful motion picture even on short notice. This paper suggests a few of them.

Technique

Whether a film is made after careful planning, or on short notice, there are basic techniques which must be followed in either case. The editing, narration, and instructions for the final printing are quite the same. The big difference lies in the hurried conference with the surgeon and in the actual shooting of the film. In the final analysis one might classify the development of an impromptu surgical motion picture film into seven phases: (1) conference with the surgeon; (2) the shooting of the film; (3) the editing of the original film; (4) the editing of the work print; (5) preparing the script for narration; (6) the editing of the original film to the work print; (7) instructions for final printing.

Conference With the Surgeon: The usual sequence of events is that at an early morning hour; for example, 8:00 a.m., the photographer is notified to prepare for filming a surgical operation scheduled for 10:00 a.m. that day. Possibly the photographer is also told that the technique to be filmed is relatively new and that the motion picture is to be used extensively. This is sometimes the extent of his information. All he can do in such a case is to assemble his equipment and then await the surgeon in the locker room where he holds a hurried conference while the Surgeon is changing clothes. Clearly, time is of the essence; therefore, it is up to the photographer to make the most of it. He must have his questions well phrased so as to learn the purpose of the film,

the surgical technique to be demonstrated, and any other specific aspects of the operation the surgeon desires to illustrate. Then, it is the task of the photographer to instruct the surgeon as to how the surgical procedure can best be put on film. The surgeon must understand that it is far better to shoot a few extra feet of each scene, which can later be cut, rather than find the scenes are too short to be effective. The surgeon should be impressed with the fact that each important step in the operation must be photographed soon enough in order to reach its climax gradually, and then continue for a short time thereafter. It is most important, that the surgeon agree to permit the photographer to make suggestions as the operation proceeds.

The Shooting of the Film: In the operating room the equipment is placed at a vantage point just over the surgeon's shoulder. It has been found that, with the operating table elevated to its normal position, the incident light meter reading with two 750 watt kegg lights adjusted for flood three feet away from the operating table and seven feet high, will produce approximately 960 foot candles while the overhead surgical light reads at 1920 foot candles or one full stop more illumination than produced by the keggs. This being the case, the decision is made to base exposure on the intensity of the overhead surgical light and to employ the keggs simply as fill-ins. However, it must be recognized that, as the surgeon works deeper into the operative site, there will be need for gradually opening the lens diaphragm. Conversely, while the incision is being closed, the original settings must be re-established. No amount of editing can make up for failure to plan each scene to the last detail. When the plan is made, usually by a running conversation between surgeon and photographer, all the resources of photography should be called into play. Scene content should range from an over-all view of the field, to orient the viewer, to close-ups for the critical details.

The Editing of the Original Film: It is unwise to run original footage through a projector because of possible scratching or other serious damage. Consequently, when the film is returned to the photographer by the processing laboratory, he must then proceed to rough-edit and have a color or black and white edge numbered work print made.

Editing the Work Print: Surgical motion pictures are usually made in proper sequence and the necessity of rearranging scenes is rather remote. Unimportant action on the screen before or after the essential action causes the audience to lose interest momentarily. For this reason each scene should be cut at just the beginning of the action and at just the end of the action. Each scene is numbered on a script work sheet with its running time and footage recorded. It should also be remembered to allow extra length of film for the scenes where lap dissolves or fades are to be made by the printing laboratory. These laboratories will furnish editing instructions for optical effects.

The Preparation of the Script for Narration: The work print is then projected on the screen in the presence of the surgeon. He is now given the opportunity of dictating to a secretary the narrative for each previously timed scene. The film is then run back and the secretary can read the narrative while the scene is rerun. In this manner, proper word timing and other fine details can be introduced. An alternate method consists of utilizing a magnetic

stripe which has been previously applied to the work print. The surgeon can then narrate on the film and his comments transferred later to an optical sound track if necessary.

The Editing of the Original Film to the Work Print: With the aid of a synchronizer, the original film is edited exactly to the work print. With the refinements made in the final narration on the script sheets and the original film edited to the work print, the film is ready for the printing laboratory.

Instructions to the Laboratory for Final Printing: The laboratory which will make the prints must be supplied with the completed script which includes the opening and closing titles. In addition, a theme outline of the film and a letter requesting the work desired should accompany the order.

Summary

Clearly, there is no substitute for a well-planned surgical motion picture which permits the photographer and surgeon to function as a well-integrated team. But even on short notice a good film can be made if the photographer uses the short preoperative conference with the surgeon astutely, and if he follows the suggestions outlined in this paper for shooting the picture. Finally, careful attention to the editing, narration, and instructions to the laboratory for final printing will do much to compensate for the lack of adequate planning.

Acknowledgements

The author wishes to express gratitude to the Calvin Company of Kansas City, Missouri, which each year presents the motion picture workshop. It is felt that the teachings of these workshops implanted the seed out of which grew a workable technique for the management of surgical motion pictures without lengthy preplanning. The Author also wishes to express his appreciation to the Veterans Administration Visual Aids Division in Washington, D. C., for its splendid cooperation in supplying the prints which have resulted from the use of this method.

Patients Are People

C. GRAHAM EDDY

PART of our mission as medical photographers is the successful photography of patients. This requires more than our technical knowledge and skillful manipulation of photographic processes. We must also have some understanding of why we and the patients we photograph react to one another as we do. All of us are the products of our own environments, with their innumerable variations and complexities which condition our relationships with each other. It would be interesting to pursue an orderly appraisal of the psychological forces to which we are subjected, but for our purpose here, a freshening of our awareness of some environmental influences is sufficient.

Although the medical photographer and the patient he photographs are two basically similar human beings who might be expected to react more or less the same in similar situations, there are important differences. They come from differing sets of environmental influences and cannot be depended upon to react alike when they meet. From the point of view of the patient, his relationship with the medical photographer can be a very intimate one. From the point of view of the photographer, the same relationship can be a highly impersonal one. This wide range of difference does not, of course, always prevail, for the background, training, and experiences of each person will determine where in that general range their relationships with one another are likely to be. The important point is that each will bring to his brief encounter with the other his own unique set of attitudes.

Some attitude-producing factors affect photographer-patient relationships more directly than others. These are of particular interest to us. With a selected few we can identify the salient characteristics of a representative patient and a representative medical photogrpher.

Fortunately, most of the patients we photograph are reasonably well-adjusted people who do not require excessive amounts of special attention. Nevertheless, no patient is a normal person. His requirements exceed those of normal people, and his responses to stimuli of any kind may or may not range within normal limits. He did not choose to become a patient, and more likely than not he is unprepared to meet the unaccustomed demands of his new and involuntary status. He probably does not understand his illness and chafes at the restrictions he is forced to accept. He may wonder why he is being photographed. Is it right? Is it necessary? Is it an invasion of his privacy? Can he refuse? Furthermore, he is in strange surroundings. This may be his first experience in a hospital or clinic. He may be so overwhelmed by demands for adjustment that he can achieve only a minimum. All of these factors, and others, contribute to his apprehension and feeling of insecurity. His fear of the situation in which he finds himself, and his inadequacy to cope with it, intensify his self conciousness, and he may become resentful and uncooperative.

The medical photographer, on the other hand, is essentially a normal person. His requirements do not exceed those of other normal persons. His responses to stimuli, pleasant and unpleasant, remain within a normal range. Nevertheless, as a medical photographer, he does encounter some additional, special demands. He knows in advance, however, what these are likely to be and can equip himself to meet them.

The hospital or clinic where he works is familiar to him. He understands his work, and knows how and why it is to be done. He is in command of the situation and can guide it to a successful conclusion. The medical photographer is expected not only to be aware of the need for good interpersonal relationships with patients, but to know how to bring them into being. Patients are under no such obligation. While they are ill, the world is centered about them, and they expect others to adjust to their needs. This being so, the photographer needs to make most of the major adjustments if a satisfactory working relationship is to be achieved.

This he can afford to do at little or no expense to himself. Unlike a nurse or an attendant, the medical photographer spends only a short time with any one patient. He is not subjected to the seemingly unreasonable, but wearying, demands from the same patients day after day. By "rolling with the punches" and recovering between them, he can maintain his composure with relative ease. What he must always remember is that every patient who comes to him needs help of some kind.

A friendly bearing, courtesy, and tact are attributes a medical photographer needs to cultivate. If he can also develop a genuine interest in patients who are referred to him, his task will be easier and the results of his efforts will be better.

The situation in which a medical photographer and the patient he photographs find themselves is very much like any other situation where people face the problem of doing something together. Leadership, initiative, and technical knowledge are required. In our situation, these are the prerogatives of the medical photographer. If the team is to have a difficult member, this is the privilege we grant to the patient.

There are specific measures we can take to help safeguard our relationship with patients. Some of them operate more to protect the patient, while others tend to shield the photographer. All of them, however, contribute to the establishment and preservation of workable relationships between medical photographers and patients. Some of the more significant ones are worth noting. They, in turn, will suggest others.

Physical comfort is important to a patient. Heat, ventilation, fans in hot weather, etc., are important adjuncts to his well being. Uncomfortable positions, painful motion, and exposure to bright lights should be held to a minimum.

Privacy is essential with patients who are scantily clothed or nude. With fully dressed patients, privacy may be less essential, but can be important. When the patient and the photographer are of opposite sexes, it is well for the photographer to seek protection by having the patient's physician or an attendant of the same sex as the patient present when the patient is nude or partially draped.

Promptness is a cardinal virtue. Patients must not be kept waiting for

long periods of time. They tire easily and may be difficult to photograph when they are fatigued. Neither should patients be rushed. It may be extremely difficult for them to move.

Delays should be avoided, at the cost of considerable effort if necessary. The photographer should clearly understand the request for photography so there will be no fumbling when the patient is ready for him. The photographer should also be sure the requestor understands existing limitations, either inherent in the photographic process, or for other reasons.

Clear instructions to patients save many misunderstandings and awkward moments. In giving instructions, it pays to be informative. When patients understand why they are to follow instructions, it is easier for them to cooperate.

Medical opinions are the prerogative of the physician. If the medical photographer has medical opinions which he wants to express, patients are an unwise choice of audience.

Staff relationships have an important bearing on photographer-patient relationships. A good medical photographer keeps his dissatisfactions with other members of his institution to himself in the presence of patients. A patient must have confidence in those who are caring for him if he is to realize maximum benefits.

Force is to be avoided in dealing with patients. A patient who refuses to be photographed should not be forced to submit. If he cannot be persuaded to submit with fair grace, the photographer should courteously accede to his wishes.

Releases can be important documents. Although patients may never see published photographs of themselves, it is their right to know they might be published and that their permission to do so is needed. It is preferable for the attending physician to secure the release, but the photographer owes it to himself to make sure one has been obtained. Publication of medical photographs without release is not uncommon, but it is an unsafe practice and loaded with trouble for the photographer.

Anonymity may be the key to securing a release. Should the patient feel that his modesty has been violated as a result of photography, he must be reassured that the photographs will be either unidentifiable with him or strictly confidential.

A Photographic Timer For Short Exposures

JOHN P. VETTER
Western Pennsylvania Hospital, Pittsburgh, Pennsylvania

THE high sensitivity of emulsions currently used in the manufacture of printing materials, and the high actinic value of illumination in printing equipment, often requires relatively short exposures. Most exposures range from one to four seconds even when using very small diaphragm openings with projection printers. Several difficulties present themselves when short exposures and small diaphragm openings are used. First, short manual exposures are inaccurate. Second, most electrical or mechanical timers do not operate accurately below five seconds. Third, the very small diaphragm openings used will bring the diffusion glass into focus in diffusion enlargers, or produce an uneven light ef-

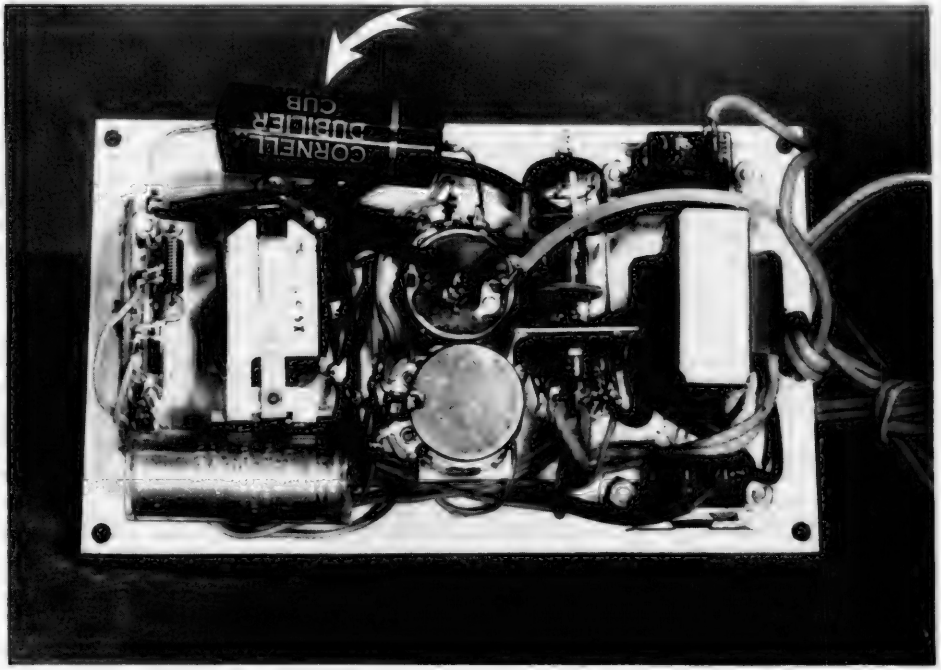

Figure 1. Wiring diagram showing the placement of the 0.5 mfd. 200 volt condenser in place of the 4 mfd. 200 volt condenser.

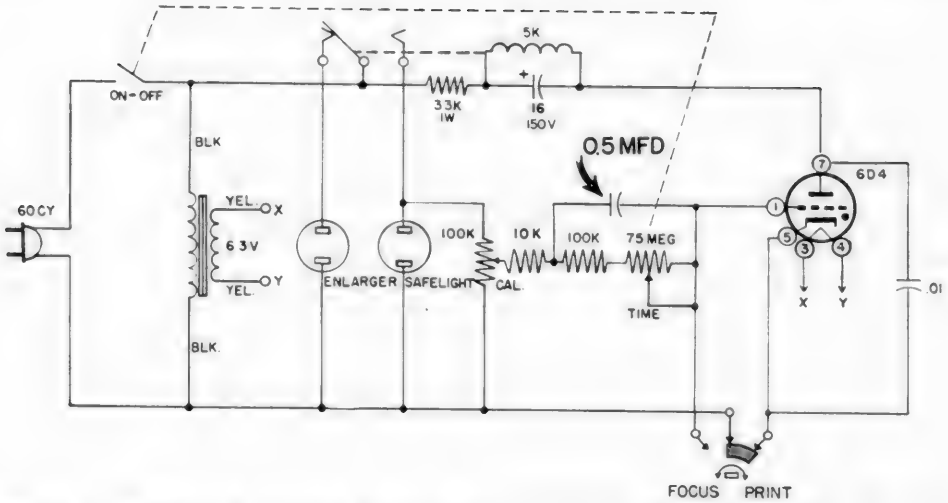

Figure 2. Schematic diagram of the timer circuit indicating where the 0.5 mfd. 200 volt condenser is to be used.

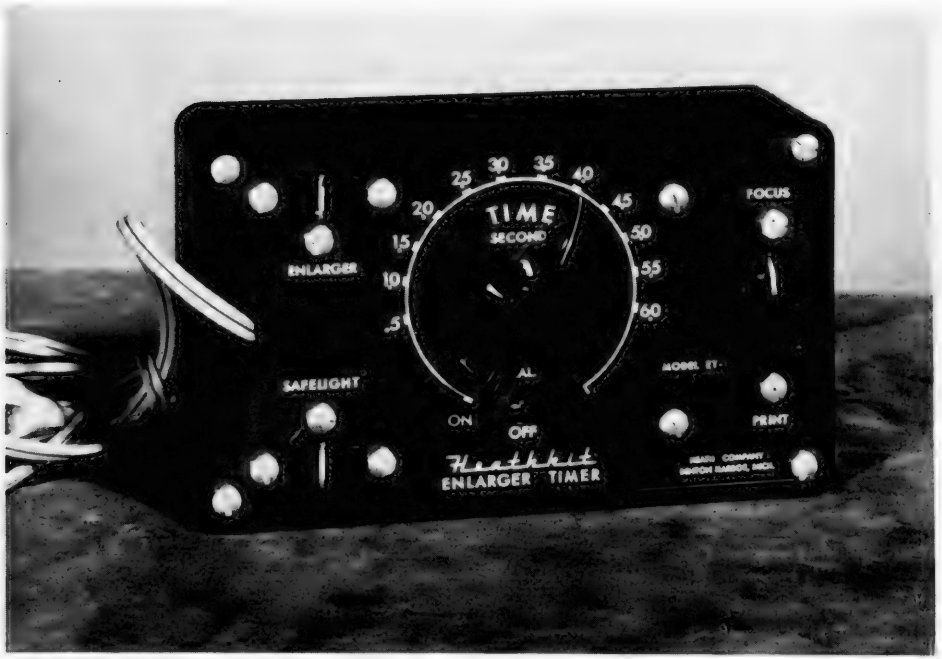

Figure 3. Top view of timer with decimal points added on the dial.

fect with some condenser enlargers.

The difficulties described above can be avoided by modifying a commercial timer. A photographic timer (Heathkit Model ET-1)[1] was purchased and assembled. (The Heathkit is easily assembled, in one evening, and is a reliable piece of equipment when completed.) The 4 microfarad 200 volt condenser was replaced with a 0.5 microfarad 200 volt condenser[2] (Fig. 1 and 2). This modification reduces the timing cycle to approximately 1/8 of the original equipment design value. The calibration control can reduce it further to 1/10 of indicated value. This value is very convenient since it only requires the addition of a decimal point on the front dial to indicate correct time values (Fig. 3). The values now read from 0.5 second to 6 seconds, in place of the original 5 seconds to 60 seconds. This makes a series of very convenient exposure times for lantern slide plates or any relatively fast paper emulsions.

More ambitious workers may desire both condensers, used with a switching arrangement, to give two time value ranges; 0.5 to 6 seconds, 5 seconds to 60 seconds. Some experimentation and a knowledge of electronic circuitry are necessary if the two ranges are to differ by a factor of 10.

Tests conducted with voltage variations between 105 to 125 volts, over a period of seven hours, showed no discernable exposure variations. The modified timer described allows short and accurate exposures, with larger lens openings, contributing to more uniform results and higher quality slides and prints.

[1]The Heathkit Photographic Timer (Model ET-1) is manufactured by Heath Company, Benton Harbor, Michigan. It comes in kit form.

[2]Obtainable at local electronic supply houses.

MEDICAL AND BIOLOGICAL ILLUSTRATION

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Association News

A section of the Journal devoted to official announcements, chapter events, and other matters of historical significance to the Association.

GENERAL NEWS

The 27th Annual Meeting was held in Rochester, Minnesota, August 27-30, 1957. The Upper Midwest Chapter did an excellent job and the meeting was a complete success both professionally and socially. Lardner Coffey was general Chairman and Stanley McComb was Chairman of the Scientific Program which was extremely well planned and varied.

Dr. Charles Mayo opened the session and we feel it quite significant that this famous and busy surgeon made time for BPA. It certainly shows that the Upper Midwest Chapter must have impressed him favorably over the years.

Leo Massopust is our new President and he has also accepted the Editorship of the Journal. Lloyd Varden is supposed to finish Vol. 24, Nos. 3 & 4; Lou Gibson will get out Vol. 25, Nos. 1 & 2; Leo Massopust will then take over and a regular schedule will be in effect.

The Certification Committee has been active and a detailed report is forthcoming with the return of the Journal.

The Scientific Exhibits Committee has circulated two exhibits "Effective Illustrations for the Oral Paper" and "The Preparation of Photographs for Publication. The Veterans Administration has paid the cost of transportation. These exhibits will be at the V.A. Hospital in Dayton, Ohio in December. For further information about their schedule contact Paul Flory, Medical Illustration Division, Research and Education, Veterans Administration, Washington 25, D.C.

The Chapters Committee meeting was well attended with representation from all but three active chapters. (West Virginia is inactive) There was no delegate present from Arkansas, Capitol or Rochester, N.Y. chapters. New charters were issued to all active chapters. It is hoped that the chairman of each chapter will display the charter and pass it along to his successor in office. There were many valuable suggestions made, which, generally revolved around the long-standing complaint of not enough contact with other chapters or with the National group. (This Bulletin was an attempt to improve that contact but we found that its existence was practically unknown among those present. This means, of course, that it has not gone beyond the local secretaries to whom it was mailed. This edition, therefore, is being sent to those members who were present at the Chapters Meeting and we hope it will be read or circulated at the local meetings. Some chapters felt they were scraping the bottom for local programs—reference to back numbers of this Bulletin will tell you what other chapters have been doing and may provide suggestions around which to build future chapter meetings. Several chapters asked for a name and address contact for each chapter. These follow in the Chapter News Section.

Two new chapters are in the process of formation: the Intermountain Chapter with headquarters in Salt Lake City has submitted their constitution and elected officers. Howard Tribe is President, Max Randle Vice-President, Dr. McNulty Secretary and Julian Mack Treasurer. The Pacific-Northwest Chapter held a preliminary meeting in Seattle last November and elected Mr. Clifford Freehe as acting Chairman. They plan to hold meetings every three months and rotate from Seattle, Washington to Vancouver, B.C. to Portland, Oregon. We bid these chapters welcome and look forward to great activity in these areas.

The two BPA exhibits "Effective Illustrations for the Oral Paper" and "The Preparation of Photographs for Publication" have been widely circulated, thanks to the efforts of C. Graham Eddy and Paul Flory, and to the cooperation of the Veterans Administration. They were in Dayton, Ohio and Memphis, Tennessee during October; Cincinnati in November; New Orleans in December. If they have not been to your area and you would like to have the display contact either Graham Eddy or Paul Flory, Research and

Education, Veterans Administration, Washington 25, D.C.

Two joint meetings will be held in the spring. On March 29 the New York chapter and the St. Lawrence Valley Chapter will meet in Albany. All BPA members are welcome. There will be outstanding speakers and workshops in the field of photomicrography. Some of the well known people who will be on hand are Julius Webber, Philip Oppelman, Carl Brinkmann, Oscar Richards and Roman Vishniac. Added attractions are a salon and a dinner — maybe even a cocktail party. For further information contact Percy Brooks, Cornell U. Medical College, 1300 York Ave., N.Y. 21, N.Y. In Los Angeles on April 18, 19 and 20 there will be a combined meeting of Southern and Northern California Chapters. A tentative program calls for Open House at UCLA Medical School, an evening of motion picture review, a day of scientific papers and informal symposiums, and a banquet. Again, all BPA members are welcome. If you see any chance of "April in L.A." contact William Renner, 966 Meadowsweet Drive, Corte Madera, Cal.

We were just as pleased as you were when the long-awaited Journal arrived today. We have it straight from our new Journal Editor and President, Leo Massopust, that the "Symposium" issue will go on the presses directly following this issue just received. From then on it should be smooth sailing — providing, if course, we all do our part by writing up our ideas, techniques and apparatus and sending them along to Leo.

CHAPTERS

Arkansas: We have heard nothing from this chapter since 1955. The Secretary at that time was Mary J. McKnight, 3312 West Capitol Ave., Little Rock.

Boston: There were 7 members of this chapter at the Annual Meeting and we think this was pretty good since it was almost 2,000 miles from home. We entered a "Chapter Exhibit" in the salon again this year. This was non-competitive and meant to show a cross-section of what our chapter members are doing. Local meetings start in October. Barbara Jacobs, 721 Huntington Ave., Boston 15, Mass.

Boston: Larry Brown was host at the Harvard School of Dental Medicine for the first meeting of the season. The major part of this October meeting was devoted to a resume of the Annual Meeting by the members attending. Seven members from the Boston Chapter made the trip and a Chapter Exhibit was hung in the salon. In November the group made a second trip to Providence. At the V.A. Hospital there Dr. William Fowler gave an illustrated lecture on "10,000 Years in America", based on his book by the same name.

Southern California: There was a meeting in September at the UCLA Medical Center. Edwin Udey gave an illustrated talk about the Moody Institute and its photographic team. F. Alton Everest of the Moody Institute received the National BPA Educational Award for his prints. Tom Masterson and Bill Martinsen gave the highlight of papers at the National Meeting. Avis Gregersen showed pictures taken during her recent trip to Europe. Tom Masterson UCLA Medical Center, Los Angeles 24.

Southern California: At the October meeting Floyd Saddler, West Coast representative for Technifax, described and demonstrated the processing of Diazo sensitized film transparencies. The finished products were displayed with an overhead projector. In November Lloyd Matlovsky demonstrated the Log-E-Tronic Printer and discussed the merits of Gaevert's Correctone Film which has two emulsions on one piece of stock. The December meeting was a dinner party after which Councilman Ernest Debs showed a sound film "Trip to the Holy Land as a Member of the Christian Palestine Commission".

Northern California: Welcome to our newest chapter. This youngest chapter has bid for the 1960 Annual Meeting. Their enthusiasm gives us confidence of their ability to handle it at the tender age of three. Chairman is William E. Renner, 966 Meadowsweet Drive, Corte Madera, Cal.

Northern California: The October meeting was held at the University of California Medical Center in San Francisco. It was a symposium on color photography with Joe O'Gorman of Ansco talking about the newest developments in color. Rich Thomas of the Bear Photo Service discussed the processing of color film and prints. In November Henry Raphael was host at the V.A. Hospital at Ft. Miley. Two of Mr. Raphael's films were shown "Introduction to Medical Motion Pic-

tures" and "Wide Field Laryngectomy" which won the 1953 BPA Institutional Award. A third film was made by Harold Baitz "Locating Microscopic Fields" and this won the 1956 Award. There were two more films shown, a French one, shown courtesy of the AMA "A New Technique of Medical Investigation" and "Tissue Culture Study of Bone" by Roy Hayashi. In December there was a banquet and installation of officers for 1958: Chairman John Schutz, Vice-Chairman Paul Tracy, Secretary-Treasurer Wilmer Renner.

Capitol: There was a September meeting at the Walter Reed Army Institute for Research. There was a review of the Annual Meeting by those members attending. Steve Dittmann won the award for the best scientific paper which was on the use of an overhead projector as a training aid. A film was shown "German Camera Industry Today". Capitol Chapter will be our host at the 28th Annual Meeting, August 19-22, 1958. Chester Reather Photographic Dept., Johns Hopkins Hospital, Baltimore 5, Md.

Capital: The October meeting was held at the Walter Reed Army Institute for Research. Robert Frick talked about "Photocopying and the making of Offset Plates" using the A. B. Dick Photocopying Duplicator. Bernard Salb showed a movie made by the Interchemical Corp. called "This is Color". Again at Walter Reed in November Capt. Steve Dittmann discussed the overhead projector, his award winning paper at the Annual Meeting. In December there was a social evening and business meeting at the Officers Club. Election of officers for 1958 was as follows: Chairman Steve Dittmann, Vice-Chairman L. T. Pimenta, Secretary Lt. A. H. Small, Treasurer Edna C. Jones.

Chicago: The first meeting of the season was in September at the University of Illinois College of Medicine. There was a review of the Annual Meeting by members who attended. (We missed Dorothy Pinkham this year) There was also a Product Demonstration of a new item in medical photography. Let us in on it, huh? Lou Pedigo, 5415 South University, Chicago 15, Ill.

Chicago: The W. H. Kessel Co. was host in October. They demonstrated new developments in the field of photomicrography. In November the group went to the George W. Colburn Laboratories where there was a tour and talk about production of movie film and laboratory procedures. Mervin LaRue was on hand to participate in the program. The Annual Christmas Dinner was held December 20 and an after-dinner movie by Western Electric was shown "Hemo, The Magnificent".

Houston: Miss Billye Bailey, 1819 Buffalo Drive, Houston 3, Texas.

Central Indiana: Robert F. Albright, Medical Illustration Dept., General Hospital, 960 Locke St., Indianapolis, Ind.

Midsouth: Alex Gravesen Kennedy, V.A. Hospital, Memphis, Tenn.

Upper Midwest: Many thanks for a delightful and instructive 27th Annual Meeting. Louis Nichols, Section of Photography, Mayo Clinic, Rochester, Minn.

Upper Midwest: A two-day meeting was held in Ames, Iowa, December 7 and 8. The following papers were given at the scientific session the first day: "Photography as an Aid to Education and Research", "The Visual in the Communication Scheme", "Cineradiography of Coronary Vessels", "Slow Motion Pictures as a Research Method", "Legal Aspects of Photography", "Why a VuGraph?", "Hi Speed Photography in Research", and "Illuminating Small Seeds for Photography". In the evening there was a banquet and business meeting. The next morning the group heard Lynn Baldwin speak on "Medical Photography in an Osteopathic College" and had a tour of the Agricultural Experiment Station at Iowa State College.

New York: Percy W. Brooks, Cornell University Medical College, 1300 York Ave., New York 21, N.Y.

New York: Donald Wong, new Vice-Chairman of this chapter, was the speaker at the October meeting. His subject was "Photography in Ophthalmology" and he covered external eye photography, the retina, the eye muscle and slit lamp photography. In December Mr. Evans and Mr. Crandall gave a program on Color Photography with emphasis on color printing and processing. A salon is being organized and entries will be shown in a midtown hall as well as at the joint meeting in Albany.

Northern Ohio: Thomas J. Lannon, Cleveland Clinic, Cleveland 6, Ohio.

Northern Ohio: John Muldowney was host at the October meeting at the Akron City Hospital. There was an election of officers for 1958: Chairman Robert Newhouse, Vice-Chairman David Shields, Secretary-Treasurer Frank Minello. There was a review of the Annual Meeting by those members attending. In November Tom Lannon was host at the Cleveland Clinic Hospital. Walter Grashaw of E. K. demonstrated Kodak Color Print Material Type C and showed a movie.

Philadelphia: Allen Hancock, Photographic Unit, Jefferson Hospital, 11th and Walnut Sts., Philadelphia, Penn.

Prairie: Burton W. Johnson, Audio-Visual Education, Kansas University Medical Center, Kansas City, Kansas.

Prairie: The October meeting was held at the V. A. Hospital in Topeka. There was an election of officers for 1958: Chairman Margaret Ames, Vice-Chairman Burton Johnson, Secretary-Treasurer Bernard McGinnis. A color film produced by the V.A. Hospital Photographic Department was viewed "Oral Hygiene for the Hospital Patient". A print salon was held with several mounted prints entered by each member. In November the group met at the U. of Kansas Medical Center where they held a film review. Several films by Norman McLaren were shown "Begone Dull Care", "Phantasy", "Penpoint Percussion and Loops" and "Interview With McLaren". On the program also was "Gallant Little Taylor" by Lotte Reiniger and "Motor Mania" by Walt Disney. The December meeting was a Social in Topeka.

Rochester: Charles M. Bailey, Dept. Photography, St. Mary's Hospital, Rochester, N.Y.

St. Lawrence Valley: The first meeting of the season was in September at the Montreal Neurological Institute. It was a general get-together and review of the Annual Meeting. A movie "Now Color for You" by Eastman Kodak was shown. It describes their new products Ektacolor S and Kodak Color Print C. A Rolf Czank made a trip beyond the Iron Curtain this summer. He bought a roll of new film, Ziis-Pan, produced by the government owned Bolshoi Works. It is ultra fine grain similar to panatomic X but with a very narrow latitude. For specific usages such as photomicrography this film might be a definite asset to the meticulous photographer. It may be available in Montreal in the near future. Charles P. Hodge, 3801 University St., Montreal P.Q., Canada.

St. Lawrence Valley: Since the October meeting is reported to have "flue" away, we will start with November when Gordon Parker from Ottowa was the main speaker. He explained the functioning of his Bio-Graphic Unit and pointed out some difficulties encountered in the management of a large photographic laboratory. Problem assignments in the field of cine- and microphotography and how they were resolved were discussed by members of his team. An award winning movie was shown. In December there was a business meeting and election of officers we await the results.

Wisconsin: There was a meeting in September at Marquette University School of Medicine. Murl Deusing, internationally famous for his wildlife photography, showed his film "South Africa". Anthony Kuzma, Marquette University Medical School, Dept. of Photography, 561 North 15th St., Milwaukee 3, Wisconsin.

We hope to hear from *all* chapters in time for the next Bulletin—it is up to you—if you send us the news we'll print it. A regular meeting notice will do, although we would like a somewhat more detailed report and especially a notice of change of officers.

L. B. Brown, *Chairman*
Chapters Committee

27TH ANNUAL MEETING OF B.P.A.

The 27th Annual Meeting, with the Upper Midwest Chapter as hosts, was held at the Kahler Hotel, Rochester, Minnesota, August 27-30, 1957.

We are pleased to report that there were 191 registrations. In addition, Mayo Clinic doctors and other local persons were invited to attend as our guests. Many of these people attended but did not register. Four days of technical activities were devoted to scientific papers, a tour of the Mayo Clinic, photomicrographic and motion picture workshops, the motion picture and slide showings, the print salon and fourteen commercial exhibits. The members were guests of the Mayo Clinic at the Official Luncheon on Wednesday, Aug. 28th. Maurice B. Mitchell, president, Encyclopedia Britannica Films, Inc. was the main speaker at the Annual Awards Banquet on Friday evening, Aug. 30th. The banquet was

preceded by the Eastman Kodak Company social hour.

Visiting ladies were entertained at a "get acquainted" tea as guests of the Upper Midwest Chapter, a "Demonstration of Flower Arrangements" by Mrs. Tomoka Yamamoto, and a Fashion Luncheon.

The success of this meeting can be attributed to the complete cooperation of all participating national and local members as well as invited participants. For this we wish to express our sincere appreciation and thanks.

Lardner A. Coffey, FBPA
General Chairman

COMMITTEES

Louis W. Nichols, *Secretary-Treasurer*

Scientific Program

Stanley J. McComb, FBPA, *Chairman*

Vice-Chairmen

Verlin Y. Yamamoto, FBPA
Leonard A. Julin, FBPA
Joseph K. Brown

Motion Pictures

James H. Rothenberger, *Chairman*
LeRoy P. Christenson, *Vice-Chairman*

Commercial Exhibits

Ervin W. Miller, *Chairman*
James A. Kent, *Vice-Chairman*

Print and Transparency Salon

E. Lynn Baldwin, *Chairman*
Charles J. Deutsch, *Vice-Chairman*

Publicity

Louis A. Facto, *Chairman*

Ladies Activities

Mrs. S. J. McComb, *Chairman*

FIRST BUSINESS MEETING AUGUST 27, 1957 — 10:00 A.M.

The 27th Annual Meeting of the Biological Photographic Association was called to order by Lardner A. Coffey, General Chairman. Charles Deutsch, President of the Upper Midwest Chapter, welcomed members and guests to the meeting.

President's Report

As Mr. Gibson, explained to the membership, the BPA Journal is of most tangible benefit but we were over a year late with the Journal due to unforeseeable circumstances. Numbers 3 and 4 of Volume 24 (1956) will be edited by Lloyd Varden, and the Symposium number (Nos. 1-2, Volume 25) will be under the editorship of Mr. Gibson. Leo Massopust will re-assume the responsibility of Journal Editor with the third number of Volume 25 for 1957. Then, we will gradually catch up in the schedule of the Journal.

The Symposium number will be in the mails around the first of the year. There will be a large over-run in order that members can request extra copies for their administrators. Requests for this special issue should be sent to the Secretarial Office.

The secretary's and treasurer's report were received. The nominations for officers were as follows:

President	Leo C. Massopust, Sr.
Vice Pres. (1)	John J. Beiter Verlin Yamamoto
Secretary	Jane H. Waters
Treasurer	Albert Levin
Directors(3)	Harold C. Baitz Lewis W. Koster David Lubin Frank C. Reed Howard Tribe John E. Withee

SECOND BUSINESS MEETING AUGUST 30, 1957 — 11:30 A.M.

Election of 1958 Officers and Directors

The President advised that there was a tie between Harold Baitz and John Withee for the position of Director. A second balloting was necessary and at the end of the Second Business Meeting Mr. Gibson announced the Officers and Directors as follows:

President	Leo C. Massopust, Sr.
Vice President	Verlin Y. Yamamoto
Secretary	Jane H. Waters
Treasurer	Albert Levin
Directors	Harold Baitz David Lubin Howard Tribe

1958 Meeting — Washington, D.C.

Stephen Dittmann, Chairman for the 1958 Meeting, stated that the dates had been decided upon—August 19-22. The meeting will

be held at the Shoreham Hotel, which is completely air-conditioned. Room rates will be similar to those of the Kahler Hotel. There will be a one-day session at Walter Reed Army Institute of Research with tours of the National Institute of Health and Armed Forces Institute of Pathology. The Chairmen are as follows:

Chairman	Stephen Dittmann
Associate Chairman	C. Graham Eddy
Scientific Exhibits	Louis Paul Flory
Commercial Exhibits	A. E. Clarke
Chapter Chairman	Chester Reather

1959 Meeting — Montreal, Canada

This meeting will be held at the Mt. Royal Hotel, August 31 through September 3. Mr. Hodge reported that Ansco of Canada will sponsor a smoker, and it may be possible to have a day at the National Film Board.

Bids for 1960 Meeting

Informal bids were received from: Mr. Wilmer Renner for the Northern California Chapter (San Francisco); Mr. Louis Pedigo for the Chicago Chapter; and Mrs. Margaret Ames for the Prairie Chapter (Kansas City). Mr. Gibson called for a show of hands, and the majority of members voted in favor of holding the 1960 meeting in San Francisco. Mr. Renner was asked to have a formal invitation by the Northern California Chapter sent to the President.

Subsequent Meetings

Dr. Richards also suggested that the Association meet with the American Institute of Biological Sciences at one of their annual meetings. This would bring the BPA before a great many biologists. Dr. Richards had every reason to believe that our Association would be most welcome. Since it was agreed that this might be a possibility for future action, Dr. Richards will write to the A.I.B.S. to inquire as to the location and date of their forthcoming meetings.

Howard Tribe stated that the Rocky Mountain Chapter was in the process of being formed, and this proposed chapter would like to have the BPA membership meet in Salt Lake City in 1961. The present thought is to hold the meeting at the Hotel Utah or at the University of Utah Union Building which houses four restaurants, hotel rooms for officers, dormitory buildings, etc.

Exhibits Committee

There was considerable discussion as to whether future salons should be open to members only; members and chapter members; or to anyone who wished to submit entries. The following suggestions were offered: 1.) That this decision could be left to the discretion of the Chapter involved. 2.) There should be an entry fee for non-members. 3.) $1.00 entry fee for non-members and free to members. 4.) Non-members would not be eligible to win prizes, thus stimulating interest in national membership. 5.) Restricting the salon to members and chapter members only. 6.) Inviting special sections, such as a group of photographs from non-medical biological photographers. And 7.) since the Washington meeting will be a rather large one, the Capitol Chapter should be given permission to use their own discretion as to prints submitted to the 1958 salon. If their salon arrangements were successful, they could be used as a future guide.

Lewis Koster made a motion that the President call for a show of hands on the desirability of holding an open salon, or a salon for members and chapter members only. The voting indicated that half the membership was in favor of an open salon, and the other half favored a salon for members and chapter members only.

Historical Album

As official photographer for the Association, Mr. LeDoux presented to the BPA the album of the 1956 meeting in Rochester, New York. He asked that the membership forward to the Historical Committee clippings pertaining to the science of biological photography so that they can be incorporated into the Committee's historical collection.

Motion Picture Committee

Mr. Kilvoord congratulated Mr. Rotherbenger on the fine job he had done as Motion Pictures Chairman for the 1957 meeting. The response on the motion picture survey was quite good. About 130 completed questionnaires have been received and others were still being received. The numerical figures have been tabulated. The committee discovered many interesting facts in the survey, which would be acted upon.

27th Annual Meeting

MARYLAND

Suggestions

Mr. Tribe thanked the membership for their cooperation, and advised that the committee was open for suggestions the year around. Some of the suggestions given last year had been put into effect. Photographs of the officers had been placed on a panel in the hotel hallway so that members could recognize them. The suggestion to continue the demonstration and panel type meetings had been carried out with considerable success. Various suggestions were received which will be acted upon by the Committees.

Certification

The membership was advised by the Presilent that he had received a long detailed report which would have to be simplified and broken up. He assured the membership that the Board is continuing to work on certification. The considerations will be reported later, either in mimeographed form or in the Journal, and certain facets had appeared in his "President's Page" already.

Journal Editor

Mr. Massopust was introduced to the membership as both next year's President and the Journal Editor. Mr. Massopust wanted it definitely understood that the program for the current meeting was taken care of entirely by the Upper Midwest Chapter. Since he felt that the Journal is a vital factor in the very existence of our Association, all effort will be made to bring the Journal up to date.

New Products

OLD AND HISTORICAL CAMERAS WANTED

If you have a camera that's more than 25 years old and is a real curio item, you can get a brand-new Praktina or Praktica camera in exchange for it, states Mark S. Lulinsky, vice-president of Standard Camera Corporation, 319 Fifth Avenue, New York 16, N. Y.

The reason is that Standard is creating a collection of old and historical cameras for display in its showrooms and for loan to museums, schools and public institutions, to show the long and interesting development of cameras and photography.

If you have a camera that was used, for example, to take a picture of a famous historical event, it may be of interest to Standard Camera. Or, if it is a good example of camera construction in its time, it is equally interesting.

Send a photograph of your camera, along with a description, and a history, if available, to: Old Camera Collection, Standard Camera Corporation, 319 Fifth Avenue, New York 16, N. Y.

WORLD'S FASTEST COLOR FILM NOW AVAILABLE FOR THE INDUSTRIAL MOTION PICTURE FIELD

Super Anscochrome Daylight Type the world's fastest Color Film, is now available in 16mm, 35mm, and 70mm sizes according to Ansco, Binghamton, New York, the country's oldest photographic manufacturer.

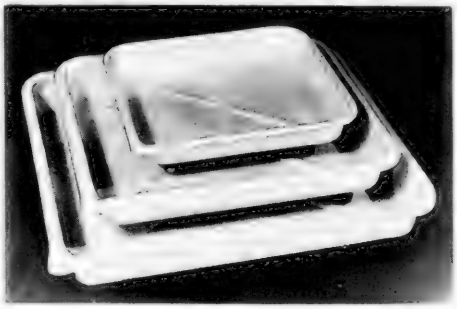
This new film which is ten times faster than traditional color films, has an official Exposure Index of 100 with normal processing. It is especially suited for the rapidly expanding specialized industrial field, brought about by the Rocket and Missile Age.

Super Anscochrome Film in 70mm width will make it possible to utilize fully the modern cameras used in Supersonic Missile tracking as well as sequence type photography.

This film is so fast that Ansco recommends it for use in professional equipment only where fast shutter speeds permit full utilization of the films extreme sensitivity to light.

NEW PLASTIC PHOTO TRAYS

The new RICHARD PHOTO TRAYS have all the features most requested by photographers: strong-lightweight-chipproof-economical. They are made of white styron plastic, the same durable, acid-resistant material as the famous Richard Print Washers. The trays come in print sizes from 9x10" to 20x24" plus a 14x17x6" deep hypo tray. All sizes have raised cross bar in bottom. All sizes except the 18x22" and 20x24" have molded pouring lip. Other features include smooth inside surface, rounded corners for easy cleaning, oversized for finger room, tapered sides for stacking. Competitively priced. Available from your local camera store or write Richard Manufacturing Co., P.O. Box 2041, Van Nuys, Calif.



VARIFOCAL LENS ZOOMS PARALLAX FREE FROM 17.5 UP TO 70mm

The "zoom-type" Pan-Cinor 17.5—70mm f/2.4 lens for the Camex Reflex—world's only 8mm single lens reflex movie camera—allows continuous through-the-lens viewing and focusing, while changing the focal length and filming without "extra" finders.

A single lever varies the focal length from 17.5mm to 70mm by moving a group of lens elements.

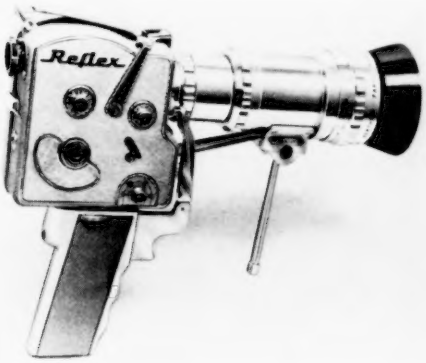
Sharpness of focus may be maintained at the different focal lengths without re-setting, by focusing the lens at 70mm (maximum) focal length. As the focal length is decreased, the increasing depth-of-field automatically keeps the focus.

The Pan-Cinor gives the movie amateur a

unique opportunity to shoot a wide scene at 17.5mm and then change to 70mm to close-in for an important detail, or vice versa.

Each lens is supplied with a depth-of-field chart and a test film and carries an unconditional guarantee for highest optical performance.

Distributed in the U. S. exclusively by Karl HEITZ, Inc., 480 Lexington Ave., New York 17, N. Y., through franchised Camex dealers, the Camex Reflex with Pan-Cinor retails for $539.00. The lens alone sells for $339.00, incl. lensshade and filter holder.



NEW 2¼x2¼ AUTOFOCUS ENLARGER HAS LENS TURRET

The new PRIMOS 2¼x2¼ Autofocus Turret-Enlarger offers rapid ONE-HAND operation with completely automatic, guaranteed foolproof focusing.

Constructed of sturdy chrome finished metal, the unit comes equipped with a rotating double-lens turret with 75mm f/4.5 SCHNEIDER Componar for 1.4 up to 8.5X magnification and a 50mm f/4.5 SCHNEIDER Componar for magnification of 35mm film from 3.9 up to 14X (larger magnifications by hand).

Supported by a parallelogram bridge suspension with spring counter balance, the tilt-back head with heat-absorbing base is easily lowered or raised and fixed into any desired position, maintaining critical focus for any enlargement. A special focus adjustment rod allows Autofocusing with any enlarging easel. Double condensor and adjustable light source assure perfectly even illumination. Compensation for imperfect negatives is achieved with a built-in distortion correction mechanism.

Accessories include dustless and Newton ring free negative carriers, masks for smaller film sizes and a filter drawer for color work.

Distributed in the U. S., exclusively by Karl HEITZ, Inc., 480 Lexington Ave., New York 17, N. Y., the PRIMOS 2¼x2¼ AUTOFOCUS Turret Enlarger is available through franchised dealers for $289.50, including both lenses and red filter.

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FELLOWSHIP PROCEDURE

Members may propose for Fellowship in the BPA other members whom they consider worthy of recognition. To be eligible for Fellowship a candidate must have been a member of the Association for five consecutive years and must possess one or more of the following qualifications:

Superior craftsmanship in still or motion picture photography of biological subjects.

Ability in photographic research in new methods or materials.

(These require submission of evidence.)

Meritorious contributions to biological photography overall through sustained organizational work.

Two sponsors are required. The sponsors should be well acquainted with the candidate's work and ready to furnish the Board with details of his experience and achievements. Those who wish to sponsor a member whom they believe to be eligible should request a Fellowship Application form from the Secretary of the Fellowship Committee: Mrs. Maria Ikenberg, University of Illinois, 904 W. Adams Street, Chicago 7, Illinois.

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